MATHEMATICS (PHD)

Department Website (http://math.nyu.edu)

NYSED: 08308 **HEGIS:** 1701.00 **CIP:** 27.0101

Program Description

The Department of Mathematics is part of the Courant Institute of Mathematical Sciences (https://cims.nyu.edu/), an independent division of New York University (https://www.nyu.edu/). Based in Warren Weaver Hall, at the heart of New York University's Washington Square campus, it is one of the top-ranked Mathematics departments worldwide (#4 in the US and #9 in the world as per the Shanghai rankings (https://www.shanghairanking.com/rankings/gras/2022/RS0101/); #6 in the US and #8 in the world as per the QS rankings (https://www.topuniversities.com/university-rankings/university-subject-rankings/2022/mathematics/)).

For more on the Courant Institute and its pioneering history in the field of applied mathematics (our department is consistently ranked #1 in applied mathematics as per USNews), see the history page (http://cims.nyu.edu/about/history.html).

The study of mathematics can lead to a variety of exciting professional careers. Basic research, engineering, finance, business, and government service are among the opportunities open to those with mathematical training. Moreover, with the increasing importance of basic science and information technology, prospects for careers in the mathematical sciences are very good. Mathematical analysis and computational modeling are important for solving some of the most pressing problems of our time - new energy resources, climate change, risk management, epidemiology, to name a few. We must strive to maintain our technological edge; mathematical skills will be crucial to this effort.

Some more specific business positions include portfolio analysis, design studies, statistical analysis, computer simulation, software design and testing, and other areas of operations research. There are extensive opportunities for mathematics in finance, the actuarial fields, and economic forecasting.

Many laboratories, both government and private, maintain independent research staffs that include mathematicians. Their work often deals with the development of new technology, including research in basic physics and software development, as well as applied mathematics. Numerical simulation, such as weather and climate forecasting, depends heavily on the use of supercomputers.

Practical considerations aside, there is the pleasure of learning, applying, and creating mathematics. Real world issues pose problems that can be studied by formulating and analyzing mathematical models. In some cases applications may lead to new mathematics, and a new branch of the science is born. In other cases abstract theory finds unexpected practical purpose. Working on research problems is exciting; solving difficult problems successfully is, for many, satisfaction enough.

Admissions

All applicants to the Graduate School of Arts and Science (GSAS) are required to submit the general application requirements (https://gsas.nyu.edu/nyu-as/gsas/admissions/arc.html), which include:

- Academic Transcripts (https://gsas.nyu.edu/nyu-as/gsas/admissions/arc/academic-transcripts.html)
- Test Scores (https://gsas.nyu.edu/nyu-as/gsas/admissions/arc/test-scores.html) (if required)
- Applicant Statements (https://gsas.nyu.edu/nyu-as/gsas/admissions/arc/statements.html)
- Résumé or Curriculum Vitae
- Letters of Recommendation (https://gsas.nyu.edu/nyu-as/gsas/admissions/arc/letters-of-recommendation.html), and
- A non-refundable application fee (https://gsas.nyu.edu/admissions/arc.html#fee).

See Mathematics (https://gsas.nyu.edu/admissions/arc/programs/mathematics.html) for admission requirements and instructions specific to this program.

Dual-Degree

The Mathematics Department offers a dual-degree with the NYU School of Law: (https://www.law.nyu.edu/jdadmissions/dualdegreeprograms/jdma/) Mathematics PhD/Law JD.

See Mathematics (https://gsas.nyu.edu/admissions/arc/programs/mathematics.html) for admission requirements and instructions specific to this program.

Program Requirements

The program requires the completion of 72 credits. It is possible, with departmental permission, to take courses relevant to students' course of study in other departments at NYU or at other universities. A minimum of 32 credits must be completed at the Department of Mathematics.

Course	Title	Credits
Major Requirements		
MATH-GA ----	Mathematics Courses	32
Electives		
Other Elective Credits		40
Total Credits		**72**

Additional Program Requirements

Written Comprehensive Examination

The examination tests the basic knowledge required for any serious mathematical study; it is comprised of three individual examinations in Advanced Calculus, Complex Variables, and Linear Algebra, and is given on three consecutive days, twice a year, in early September (or, sometimes, late August) and early January. Each section is allotted three hours and is written at the level of a good undergraduate course. Samples of previous examinations are available in the departmental office. Cooperative preparation is encouraged, as it is for all examinations. Students may take the written examination twice; a third and final time requires the permission of the Director of Graduate Studies.

Oral Preliminary Examination

This examination is usually taken after two years of full-time study. Its purpose is to determine if the candidate has acquired sufficient mathematical knowledge and maturity to commence a dissertation. The orals are comprised of a general section and a special section, each lasting one hour, and are conducted by two different panels of three faculty members. The examination takes place three times a year: fall, mid-winter and late spring. Cooperative preparation of often helpful and is encouraged. Students may take the oral examination twice; a third and final time requires the permission of the Director of Graduate Studies.

All students must take the oral examinations in order to be allowed to register for coursework beyond 60 points. It is recommended that students attempt the examinations well before this deadline.

Dissertation Defense

The oral defense is the final examination on the student's dissertation. The defense is conducted by a panel of five faculty members (including the student's advisor) and generally lasts one to two hours. The candidate presents his/her work to a mixed audience, some expert in the student's topic, some not. Often, this presentation is followed by a question-and-answer period and mutual discussion of related material and directions for future work.

Departmental Approval

All Graduate School of Arts & Science doctoral candidates must be approved for graduation by their department for the degree to be awarded.

Sample Plan of Study

Course	Title	Credits
1st Semester/Term		
MATH-GA ----	Mathematics PhD course	3
MATH-GA ----	Mathematics PhD course	3
MATH-GA ----	Mathematics PhD course	3
MATH-GA ----	Mathematics PhD course	3
	Credits	**12**
2nd Semester/Term		
MATH-GA ----	Mathematics PhD course	3
MATH-GA ----	Mathematics PhD course	3
MATH-GA ----	Mathematics PhD course	3
MATH-GA ----	Mathematics PhD course	3
	Credits	**12**
3rd Semester/Term		
MATH-GA ----	Mathematics PhD course	3
MATH-GA ----	Mathematics PhD course	3
MATH-GA ----	Mathematics PhD course	3
MATH-GA ----	Mathematics PhD course	3
	Credits	**12**
4th Semester/Term		
MATH-GA ----	Mathematics PhD course	3
MATH-GA ----	Mathematics PhD course	3
MATH-GA ----	Mathematics PhD course	3
MATH-GA ----	Mathematics PhD course	3
	Credits	**12**
5th Semester/Term		
MATH-GA ----	Mathematics PhD course	3
MATH-GA ----	Mathematics PhD course	3
MATH-GA ----	Mathematics PhD course	3
MATH-GA ----	Mathematics PhD course	3
	Credits	**12**
6th Semester/Term		
MATH-GA ----	Mathematics PhD course	3
MATH-GA ----	Mathematics PhD course	3
MATH-GA ----	Mathematics PhD course	3
MATH-GA ----	Mathematics PhD course	3
	Credits	**12**
	Total Credits	**72**

Following completion of the required coursework for the PhD, students are expected to maintain active status at New York University by enrolling in a research/writing course or a Maintain Matriculation (MAINT-GA 4747) course. All non-course requirements must be fulfilled prior to degree conferral, although the specific timing of completion may vary from student-to-student.

Learning Outcomes

Upon successful completion of the program, graduates will have:

1. Mastery of the fundamental methods of basic areas in mathematics broadly related to their future research.
2. Deep working knowledge of the theories, concepts and open questions in the selected area of research.
3. Mastery in written communication sufficient for writing research articles acceptable for publication in peer-reviewed journals.
4. Proficiency in oral communication sufficient to give lectures and presentation at scientific conferences and symposiums.
5. Lecturing skills which enables them to teach courses in the future in broad areas in mathematics.
6. Mastery of the modern tools and classical methods in the selected area of research.
7. The ability to formulate sound research programs and bring a research project to fruition in the form of a peer-reviewed publication.

Policies

NYU Policies

University-wide policies can be found on the New York University Policy pages (https://bulletins.nyu.edu/nyu/policies/).

Graduate School of Arts and Science Policies

Academic Policies for the Graduate School of Arts and Science can be found on the Academic Policies page (https://bulletins.nyu.edu/graduate/arts-science/academic-policies/).